

Docket No.: 12810-00237-US1
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Frank Dietsche et al.

Application No.: 10/595,494

Confirmation No.: 1545

Filed: October 23, 2006

Art Unit: 1794

For: ESSENTIALLY CHROMIUM-FREE METHOD
FOR PASSIVATING METALLIC SURFACES
CONSISTING OF ZN, ZN ALLOYS, AL OR
AL ALLOYS

Examiner: M. R. Jackson

APPEAL BRIEF

MS Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Madam:

As required under 37 C.F.R. § 41.37(a), this brief is filed within two months of the Notice of Appeal filed in this case on December 12, 2011, and is in furtherance of said Notice of Appeal.

The fees required under 37 C.F.R. § 41.20(b)(2) are dealt with in the accompanying TRANSMITTAL OF APPEAL BRIEF.

This brief contains items under the following headings as required by 37 C.F.R. § 41.37 and M.P.E.P. § 1205.2:

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|------|-----------------------------------|
| I. | Real Party In Interest |
| II | Related Appeals and Interferences |
| III. | Status of Claims |
| IV. | Status of Amendments |
| V. | Summary of Claimed Subject Matter |

VI.	Grounds of Rejection to be Reviewed on Appeal
VII.	Argument
VIII.	Claims
Appendix A	Claims
Appendix B	Evidence
Appendix C	Related Proceedings

I. REAL PARTY IN INTEREST

The real party in interest for this appeal is:

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II. RELATED APPEALS AND INTERFERENCES

There are no other appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

A. Total Number of Claims in Application

There are 18 claims pending in application.

B. Current Status of Claims

1. Claims canceled: 8, 9, and 18-24
2. Claims withdrawn from consideration but not canceled: 0
3. Claims pending: 1-7, 10-17, and 25-27
4. Claims allowed: 0
5. Claims rejected: 1-7, 10-17, and 25-27

C. Claims On Appeal

The claims on appeal are claims 1-7, 10-17, and 25-27

IV. STATUS OF AMENDMENTS

Applicant did not file an Amendment After Final Rejection.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The instantly claimed subject matter is directed at providing an improved, substantially chromium-free process for passivating metallic surfaces on Zn, Zn alloys, Al or Al alloys, which affords improved corrosion protection while requiring only short contact times between the metallic surfaces and the formulation used for passivation. In particular, the process may also be implemented in a continuous process. Please see page 4, line 41 to page 5, line 4, of the specification.

According to claim 1, metallic surfaces of Zn, Zn alloys, Al or Al alloys are passivated by treating the surface with an acidic aqueous formulation having a pH of from 1 to 6 of a polymer comprising -COOH groups and/or salts thereof (page 5, lines 6-10, and page 10, lines 11-14) wherein the formulation (Z) used for the treatment at least comprises

(a) at least one substantially noncrosslinked, water-soluble copolymer (A) comprising at least 50% by weight of (meth)acrylic acid units and 5 to 40% by weight of at least one comonomer which comprises acidic groups but is other than (meth)acrylic acid, in a concentration of from 0.1 g/l to 200 g/l (page 10, lines 1-9, and page 8, lines 11-12), and

(b) water or an aqueous solvent mixture (B) comprising at least 80% by weight of water (page 9, lines 33-35),

and the surface is further treated with at least one water-soluble crosslinker, the crosslinker comprising at least 2 crosslinking groups selected from the group consisting of azirane, oxirane, and thiirane groups and joined to one another by means of a linking group (X) comprising at least 2 carbon atoms, the number-average molecular weight M_n of the crosslinker being from 112 to 5000 g/mol, the solubility of the crosslinker in water being at least 10 g/l, and the treatment with the crosslinker being carried out before, after or simultaneously with the treatment with the formulation (Z) (page 5, lines 18-24),

wherein a passivating layer on the metallic surface is obtained whose thickness is from 0.01 to 3 micrometer (page 16, lines 32-33), and

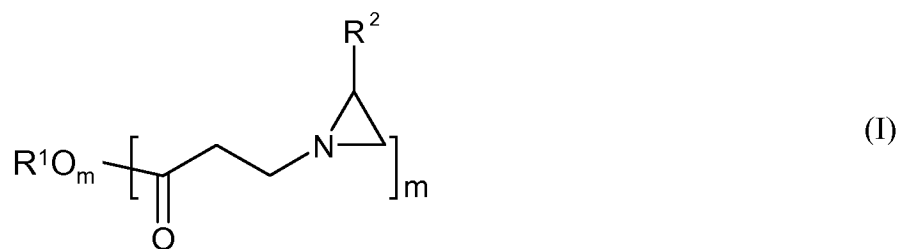
wherein the pH of the formulation is controlled by the nature and concentration of the (meth)acrylic acid units and the at least one comonomer which comprises acidic groups but is other than (meth)acrylic acid (page 10, lines 18-20).

According to claim 2, the treatment with the crosslinker and with the formulation (Z) is carried out simultaneously and the crosslinker is present in the formulation (Z). Please see page 5, lines 22-24.

According to claim 3, (Z) further comprises an organic or inorganic acid. Please see page 10, lines 22-23. Please see page 10, lines 22-23.

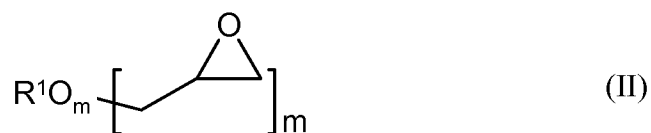
According to claim 4, the acid is H_3PO_4 and/or HNO_3 . Please see page 10, line 29.

According to claim 5, the crosslinker is a crosslinker of the general formula (I)



which contains at least two azirane groups and where m is a natural number ≥ 2 , R^1O_m - is an m -valent, aliphatic alkoxy radical, and R^2 is H or methyl. Please see page 11, lines 29-36.

According to claim 6, the crosslinker is a crosslinker of the general formula (II)



which contains at least two oxirane groups and where m is a natural number ≥ 2 ,
and R^1O_m- is an m-valent, aliphatic alkoxy radical. Please see page 13, lines 1-11.

According to claim 7, m is a natural number from 2 to 6. Please see page 13, line 7.

According to claim 10, the weight ratio of polymer to crosslinker is from 0.5 : 1 to 50 : 1. Please see page 13, lines 34-37.

According to claim 11, the solvent is water. Please see page 9, line 32.

According to claim 12, subsequently the metal surface is heated after the treatment. Please see page 15, lines 10-11.

According to claim 13, the treatment takes place by means of rolling, spraying or dipping methods. Please see page 14, lines 25-27.

According to claim 14, the metal surface is the surface of a strip metal. Please see page 15, lines 16-17.

According to claim 15, the strip metal is electrolytically galvanized or hot-dip galvanized steel. Please see page 1, lines 27-29.

According to claim 16, the treatment is carried out by means of a continuous process. Please see page 5, lines 3-4.

According to claim 17, the surface is contacted with the formulation for a time of from 1 to 60 s. Please see page 15, lines 24-26.

According to claim 25, the process further comprises synthesizing the copolymer A from 70 to 80% by weight of (meth)acrylic acid and from 20 to 30% by weight of maleic anhydride. Please see page 9, lines 16-18.

According to claim 26, the process further comprises synthesizing the copolymer A from 70 to 80% by weight of (meth)acrylic acid, from 15 to 25% by weight of maleic anhydride, and from 1 to 10% by weight of vinylphosphonic acid. Please see page 9, lines 23-25.

According to claim 27, The process according to claim 1, wherein the copolymer A further comprises a monomer containing OH-groups. Please see page 8, lines 20-22.

Support for the claimed subject matter is provided parenthetically with reference to the specification to guide the Board in its understanding of the claimed subject matter. However, support for the claims is provided throughout the specification, and is not limited to that provided in this concise summary.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

A. Has the Examiner established that claims 1-7, 10-17, and 25-27 are obvious over US Patent No. 6,514,357 to Tada et al. (hereinafter “Tada”) in view of US Patent No. 4,126,595 to Martorano et al. (hereinafter “Martorano”), and that claims 1-7, 10-17, and 25-27 are, therefore, unpatentable under 35 U.S.C. § 103(a)?

VII. ARGUMENT

A. Tada already has solved the problem that a skilled artisan allegedly would solve by combining Tada and Martorano.

Claims 1-7, 10-17, and 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tada in view of Martorano.

Claim 1 recites, among other features, that the surface is further treated with at least one water-soluble crosslinker, the crosslinker comprising at least 2 crosslinking groups selected from the group consisting of azirane, oxirane, and thiirane groups.

As appreciated by the Examiner, Tada fails to suggest features corresponding to the above-quoted features of the independent claim. However, the Office Action relies on Martorano for curing the deficiencies of Tada.

Tada is directed at metal-surface-treating agents for corrosion protection. At col. 1, lines 11-12, Tada describes the coatings suggested therein as having a superior conductivity. To achieve such coatings, Tada suggests, at col. 5, lines 17-29, pseudo-crosslinking reactions with multi-valent cations. According to col. 5, line 26, in Tada, “sufficient corrosion resistance” is obtained with pseudo-crosslinking. Thus, starting from Tada, a person skilled in the art is not directed to introduce additional “non pseudo-crosslinking,” i.e., permanent crosslinking by forming chemical bonds because Tada suggests that the compositions already achieve sufficient corrosion resistance.

Further, Tada suggests, at col. 5, line 17, that the three kind of metal ions suggested therein are essential. Further, Tada suggests, at col. 8, lines 30-31, that pseudo-crosslinking occurs between metal ions and molecules of carboxylic acids. Thus, pseudo-crosslinking is not attributed to the presence of the – optional – coupling agents, but to the specific combinations of the essential metal ions and the organic resin. Moreover, according to Tada, the coupling agents, such as the γ -glycidoxypropyltrimethoxysilane suggested at col. 10, line 31, may contain only one epoxide-group. Thus, the coupling agents are not cross-linkers that connect two polymer chains, but are compounds for introducing new functional groups, for example, into a single polymer chain.

Accordingly, the coupling agents suggested in Tada have nothing to do with crosslinking. Coupling agents are introduced “because resistance against fingerprints and adhesiveness to the overcoat can be improved.” See col. 6, lines 36-39, of Tada.

What is more, Tada suggests, at col. 5, lines 26-27, that sufficient corrosion resistance and conductivity can be achieved even when the film is thin. Accordingly, Tada provides a solution for the problem discussed therein. A skilled artisan is not directed at further improving the pseudo-crosslinked coatings of Tada because the coatings are already sufficient even when the films are thin.

In addition, Applicants respectfully submit that the Office Action, at page 3, lines 12-13, has made an insufficient showing that using a multi-functional epoxy compound would further increase the density of the coating. At col. 7, lines 20-22, Tada suggests that the coordination with metal ions makes the film more dense. However, Tada makes no mention of an increase in density caused by the coupling agents, nor can it be unequivocally stated that adding multi-functional epoxy compounds would increase the density because such a system is not described in Tada. Stated differently, the assertion in the Office Action that adding multi-functional epoxy compounds would increase the density cannot be considered, by instant and unquestionable demonstration, as being well-known.

Applicants note that Tada attributes the conductivity and corrosion resistance of the coatings suggested therein on the presence of the coupling agents, which, as suggested at col. 8, lines 43-48, of Tada not only provide for pseudo-crosslinking within the organic resin, but also provide for pseudo-crosslinking to the plating surface. Thus, we believe that a skilled artisan would not use the crosslinker of Martorano instead coupling agents of Tada because the crosslinkers of Martorano would not be expected to couple the organic resin to the plating surface.

The Office Action applies Martorano for suggesting oxirane and azirane crosslinking agents.

Martorano suggests permanent coating produced by thermosetting. Specifically, Martorano suggests pigmented or unpigmented thermosettable compositions, which may be applied as “metal decorating” to beer cans, vegetable cans, screw caps for jars, and aerosol containers.

Further, Martorano suggests, at col. 3, lines 26-27, that the compositions therein are stable aqueous alkaline blends. These coatings are therefore not related to the problem or the technical field of corrosion protection, especially in an acidic medium. In fact, Martorano teaches away from preparing an acidic aqueous formulation having a pH of from 1 to 6, as claimed.

Claims 2-7, 10-17, and 25-27 are in condition for allowance for at least their respective dependence on an allowable claim 1, as well as for the separately patentable subject matter that each of these claims recites.

VIII. CLAIMS

A copy of the claims involved in the present appeal is attached hereto as Appendix A. As indicated above, the claims in Appendix A include the amendments filed by Applicant on November 23, 2010.

Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 22-0185, under Order No. 12810-00237-US1 from which the undersigned is authorized to draw.

Dated: January 19, 2012

Respectfully submitted,

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APPENDIX A - CLAIMS

Claims Involved in the Appeal of Application Serial No. 10/595,494

1. A substantially chromium-free process for passivating metallic surfaces of Zn, Zn alloys, Al or Al alloys by treating the surface with an acidic aqueous formulation having a pH of from 1 to 6 of a polymer comprising -COOH groups and/or salts thereof wherein the formulation (Z) used for the treatment at least comprises

(a) at least one substantially noncrosslinked, water-soluble copolymer (A) comprising at least 50% by weight of (meth)acrylic acid units and 5 to 40% by weight of at least one comonomer which comprises acidic groups but is other than (meth)acrylic acid, in a concentration of from 0.1 g/l to 200 g/l, and

(b) water or an aqueous solvent mixture (B) comprising at least 80% by weight of water,

and the surface is further treated with at least one water-soluble crosslinker, the crosslinker comprising at least 2 crosslinking groups selected from the group consisting of azirane, oxirane, and thiirane groups and joined to one another by means of a linking group (X) comprising at least 2 carbon atoms, the number-average molecular weight M_n of the

crosslinker being from 112 to 5000 g/mol, the solubility of the crosslinker in water being at least 10 g/l, and the treatment with the crosslinker being carried out before, after or simultaneously with the treatment with the formulation (Z),

wherein a passivating layer on the metallic surface is obtained whose thickness is from 0.01 to 3 micrometer, and

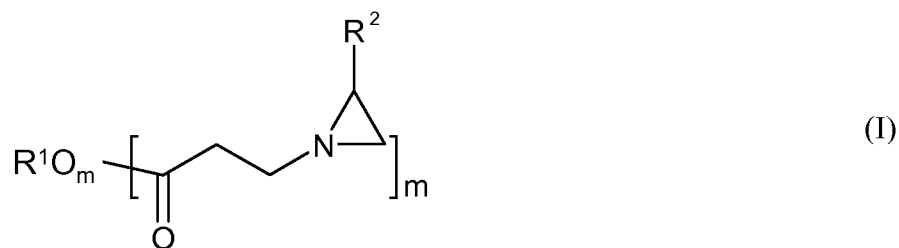
wherein the pH of the formulation is controlled by the nature and concentration of the (meth)acrylic acid units and the at least one comonomer which comprises acidic groups but is other than (meth)acrylic acid.

2. The process according to claim 1, wherein the treatment with the crosslinker and with the formulation (Z) is carried out simultaneously and the crosslinker is present in the formulation (Z).

3. The process according to claim 1, wherein (Z) further comprises an organic or inorganic acid.

4. The process according to claim 3, wherein the acid is H_3PO_4 and/or HNO_3 .

5. The process according to claim 1, wherein the crosslinker is a crosslinker of the general formula (I)



which contains at least two azirane groups and where m is a natural number ≥ 2 , R^1O_m - is an m -valent, aliphatic alkoxy radical, and R^2 is H or methyl.

6. The process according to claim 1, wherein the crosslinker is a crosslinker of the general formula (II)



which contains at least two oxirane groups and where m is a natural number ≥ 2 ,
and $\text{R}^1\text{O}_m\text{---}$ is an m-valent, aliphatic alkoxy radical.

7. The process according to claim 5, wherein m is a natural number from 2 to 6.
10. The process according to claim 1, wherein the weight ratio of polymer to crosslinker is from 0.5 : 1 to 50 : 1.
11. The process according to claim 1, wherein the solvent is water.
12. The process according to claim 1, wherein subsequently the metal surface is heated after the treatment.

13. The process according to claim 1, wherein the treatment takes place by means of rolling, spraying or dipping methods.

14. The process according to claim 1, wherein the metal surface is the surface of a strip metal.

15. The process according to claim 14, wherein the strip metal is electrolytically galvanized or hot-dip galvanized steel.

16. The process according to claim 14, wherein the treatment is carried out by means of a continuous process.

17. The process according to claim 14, wherein the surface is contacted with the formulation for a time of from 1 to 60 s.

25. The process according to claim 1, further comprising synthesizing the copolymer A from 70 to 80% by weight of (meth)acrylic acid and from 20 to 30% by weight of maleic anhydride.

26. The process according to claim 1, further comprising synthesizing the copolymer A from 70 to 80% by weight of (meth)acrylic acid, from 15 to 25% by weight of maleic anhydride, and from 1 to 10% by weight of vinylphosphonic acid.

27. The process according to claim 1, wherein the copolymer A further comprises a monomer containing OH-groups.

APPENDIX B - EVIDENCE

No evidence pursuant to 37 C.F.R. §§ 1.130, 1.131, or 1.132 or entered by or relied upon by the examiner is being submitted.

APPENDIX C – RELATED PROCEEDINGS

No related proceedings are referenced in II. above, hence copies of decisions in related proceedings are not provided.